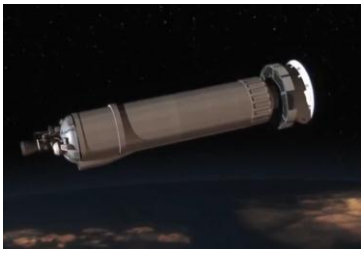


Centaur 50th Anniversary Engineering Design Challenge "Pushing the Limits"

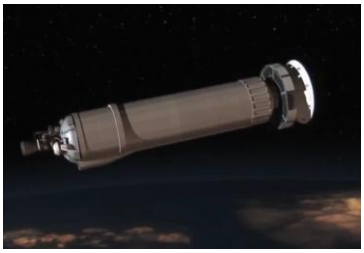
Facilitator Notes

The Challenge:

Students will design and build a self-propelled vehicle that uses air pressure (propellant) contained in a common rubber balloon that can transport a single removable payload (25 gram weight) as it travels along the ground on a "Challenge Field Map" from a "Launch Site" to a " Mid-point area", and then to a final "Rendezvous Point". During the traveling process the self-propelled vehicle will be required to come to a complete stop in order to make a mid-course directional correction. After the vehicle has made its mid-course correction it will need to restart and propel itself to the final Rendezvous Point on the challenge field map.

Procedure:

- **Prepare ahead of time**
  - Read the following documents to become familiar with the design challenge components.
    - Student Design Challenge Guide
    - Student Data Sheet
    - Challenge Field Map Specifications
    - Engineering Design Process
    - Written Component Guidelines
    - NASA Education Pre/Post-Assessment
  - Review the Optional Classroom Activities and Resources listed on page 28. Gather the required materials listed on the "Student Design Challenge Guide" and any other supplies the teams may be able to use for their vehicles.
  - Create teams of four to six students
- **Introduce the challenge** (15 minutes)
  - Explain to students the importance of taking the knowledge learned in the Rocket Races Activity to design and create a propulsion vehicle that meets the requirements of the Centaur design challenge.
  - Discuss with students the importance of Centaur's ability to stop mid-course and change direction, with the overall goal of reaching the final rendezvous point as close to the bull's-eye as possible.(See field map).
  - Explain the purpose of reaching the mid-course target area and also the reason for restarting the vehicle to reach the final rendezvous point.
  - Brainstorm possibilities of approaches to reach the mid-point area and the rendezvous point as a class.



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- **Student Team Work**
  - Suggested positions for members: Design Engineer, Writing Engineer, Research Engineer, Technical Engineer, Operations
  - Create a field map outline on the floor by using a tape measure and masking tape to a rectangular dimension of 5 ft. by 12 ft. (See field map.)
  - Teams design, construct, and test through trial and error, a vehicle which meets the specified challenge requirements
  - Teams record the changes and or modifications that are made to vehicle throughout the engineering design process, including why the changes were required, what changes were made, and what was the outcome of the changes.

- **Report Out**
  - Teams report their designs and what they have learned with a tri-fold poster presentation including a 500 word essay on their team designs and modifications, and how the teams design relates to Centaur. (See Tri-fold guidelines).